Robert A. Saccone
Vice President – Nuclear Operations

PPL Susquehanna, LLC
769 Salem Boulevard
Berwick, PA 18603
Tel. 570.542.3698 Fax 570.542.1504
rasaccone@pplweb.com

JUN 21 2005

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Stop OP1-17
Washington, DC 20555

SUSQUEHANNA STEAM ELECTRIC STATION
LICENSEE EVENT REPORT 50-388/2005-003-00
LICENSE NO. NPF-22
PLA-5913 **Docket No. 50-388**

Attached is Licensee Event Report (LER) 50-388/2005-003-00. This event was determined to be reportable per 10 CFR 50.73(a)(2)(iv)(A) for an unplanned actuation of systems that mitigate the consequences of significant events. The Unit 2 reactor was manually scrammed in response to a loss of cooling to the B Phase Main Transformer. As an expected result of the scram, reactor water level decreased to the setpoint for a RCIC initiation. RCIC auto-started and, in conjunction with normal feedwater flow, recovered reactor water level to its normal operating level. The manual actuation of RPS and the subsequent injection of the RCIC system are considered unplanned actuations of systems that are designed to mitigate the consequences of significant events. This event resulted in no actual adverse consequences to the health and safety of the public.

No commitments are associated with this LER.

Robert Saccone
Vice President – Nuclear Operations

Attachment

IE22

cc: Mr. S. Collins
Regional Administrator
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Mr. A. Blamey
Sr. Resident Inspector
U.S. Nuclear Regulatory Commission
P.O. Box 35
Berwick, PA 18603-0035

Mr. R. Osborne
Allegheny Electric Cooperative
P. O. Box 1266
Harrisburg, PA 17108-1266

Mr. R. R. Janati
Bureau of Radiation Protection
Rachel Carson State Office Building
P. O. Box 8469
Harrisburg, PA 17105-8469

NRC FORM 366 (6-2004)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Susquehanna Steam Electric Station Unit 2	05000388	1 OF 3

4. TITLE Reactor Manual Scram due to Loss of Main Transformer Cooling

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
4	28	2005	2005	003	00	6	21	2005	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE 1

10. POWER LEVEL 75%

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER *(Include Area Code)*
Dayne R. Brophy, Senior Engineer – Nuclear Regulatory Affairs	(570) 542-3365

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	EL	XFMR	ABB	Y					

14. SUPPLEMENTAL REPORT EXPECTED		15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)*	☒ NO				

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

At approximately 0700 hours on 4/28/2005 with Unit 2 in Mode 1 at 100% power, the Control Room received a B Phase Main Transformer alarm. Operators were dispatched and found the cooling system for the transformer not operating. Without cooling, plant alarm procedures require removal of the transformer from service. Reactor power was reduced from 100% to 75% while attempting to restore transformer cooling to minimize any adverse impact to the transformer. Attempts to restore the B Main Transformer cooling were unsuccessful and the reactor was manually scrammed at 0719 hours. The event was determined to be reportable under 10 CFR 50.72, reference ENS Notification EN #41646.

Following the manual scram, the Unit 2 electrical output breakers automatically opened as designed removing the electrical load from the Main Transformers. The other plant systems also responded per design. RPV water level decreased to –30" due to the SCRAM, which resulted in RCIC initiating. Normal Feedwater and RCIC systems restored water level. The manual scram and subsequent injection of the RCIC system are considered unplanned actuations of systems that mitigate the consequences of significant events and are reportable per 10 CFR 50.73(a)(2)(iv)(A).

This event resulted in no actual adverse consequences to the health and safety of the public.

LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Susquehanna Steam Electric Station Unit 2	05000388	2005	– 003	– 00	2 OF 3

17. NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

PLANT CONDITIONS AT TIME OF EVENT

Unit 1, Mode 1, 100%
Unit 2, Mode 1, 75%

EVENT DESCRIPTION

Unit 2 has three single phase main transformers (EIIS Code: EL), A, B, & C that supply power to the 500 kV switchyard EIIS Code: FK) for grid distribution. The transformers are cooled via a circulating oil system that transfers the heat to the environment through forced air-cooling. At approximately 0700 hours on 4/28/2005, with Unit 2 in Mode 1 at 100% power, the Control Room received a B Phase Main Transformer alarm. Operators were dispatched and found the cooling system for the transformer not operating. Attempts to restore the B Main Transformer cooling were unsuccessful. Without cooling, plant alarm procedures require removal of the transformer from service. During the recovery attempts, reactor power was reduced from 100% to 75% and at 0719 hours RPS (EIIS Code: JC) was manually actuated to scram the reactor. The Unit 2 electrical output breakers automatically opened as designed removing the electrical load from all three Main Transformers.

The plant response was per design. All control rods inserted and RPV water level decreased to –30", which is the setpoint for a RCIC (EIIS Code: BN) initiation. RCIC did initiate and with normal Feedwater (EIIS Code: SJ) flow, reactor water level was restored. A reactor water Level 3 (+13") containment isolation signal (EIIS Code: JM) was received, but all affected isolation valves were already in their post-isolation alignment. A reactor water Level 2 (-38") signal for Division 2 was also received. This resulted in a secondary containment ventilation isolation (Zones 2 and 3) and an auto-start of Division 2 of Standby Gas Treatment (EIIS Code: BH) and Control Room Emergency Outside Air Supply (EIIS Code: VI) Systems. A post scram evaluation determined that the instrumentation that caused the initiation signal was within its setpoint tolerance and the system response was per design.

The manual scram and subsequent injection of the RCIC system are considered unplanned actuations of systems that mitigate the consequences of significant events and are reportable per 10 CFR 50.73(a)(2)(iv)(A).

This event resulted in no actual adverse consequences to the health and safety of the public.

CAUSE OF THE EVENT

The cause of the event was attributed to two root causes:

1) The Main Transformer Cooling system contained a known design weakness that was not corrected in a timely manner. In 2003 the design weakness was discovered in the transformer cooling electrical logic. In the event of a ground fault in a transformer cooling circuit end device, the main power supply breaker could trip. In this scenario the backup power supply would also trip when called upon to energize the circuit. The evaluation of this vulnerability focussed on the component level impacts and did not adequately consider the overall potential impact to the plant.

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Susquehanna Steam Electric Station Unit 2	05000388	2005	-- 003	-- 00	3 OF 3

17. NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

2) Operators were unable to implement manual actions to restore cooling to one of the main transformers prior to initiating a reactor scram. The procedural guidance and training in response to the loss of transformer cooling were found to be weak and heavily reliant on operator experience.

ANALYSIS / SAFETY SIGNIFICANCE

Actual Consequences

The health and safety of the public was not affected. The capability to electrically isolate the Unit 2 Main Transformers using existing plant equipment and procedures was demonstrated.

The total loss of all transformer cooling for the B Main Transformer was greater than 10 minutes. Dissolved gas analysis was performed on an oil sample taken from the transformer. The analysis reflected no increase in dissolved gas generation.

Potential Consequences

The potential consequence from a total loss of all transformer cooling results in a negligible increase in the probabilistic risk to the health and safety of the public.

Total loss of all transformer cooling does increase the probability of long term degradation of the transformer.

CORRECTIVE ACTIONS

Completed Actions

1) The fault that caused the loss of cooling to the B Main Transformer was found and repaired.
2) The A and C Main Transformer cooling circuits were inspected for similar conditions.
3) The B Main Transformer oil samples were tested with satisfactory results.
4) Procedures were reviewed and revised to increase the likelihood of restoring transformer cooling within the required administrative limit.

Planned Actions

1) Correct the design deficiency for Unit 2 main transformers.
2) Review plant procedures for enhancements that will prioritize the resolution of identified deficiencies based on the impact to the system/plant.
3) Enhance training material to improve operator proficiency when responding to time critical actions.

ADDITIONAL INFORMATION

None